MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2022/2023 (TERM ID 2210)

ECE1016 – COMPUTER & PROGRAM DESIGN

(All Sections / Groups)

11 FEBRUARY 2023
9:00 A.M – 11:00 A.M
(2 hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 11 printed pages including cover page with 4 questions only.

2. Answer ALL the questions. All questions carry equal marks and the distribution of marks for each question is given.

3. Please write all your answers in the answer booklet provided.

Question 1

(a) A charity is offering special allowances to the underprivileged based on the eligibility chart shown in Figure 1(a). To check applicants' eligibility, the charity has partially written a program in Figure 1(b) that prompts the applicants to fill in their details. Complete the rest of the program so that the results shown in Figure 1(c) appear upon usage. Use `if-else` nested statements in your program.

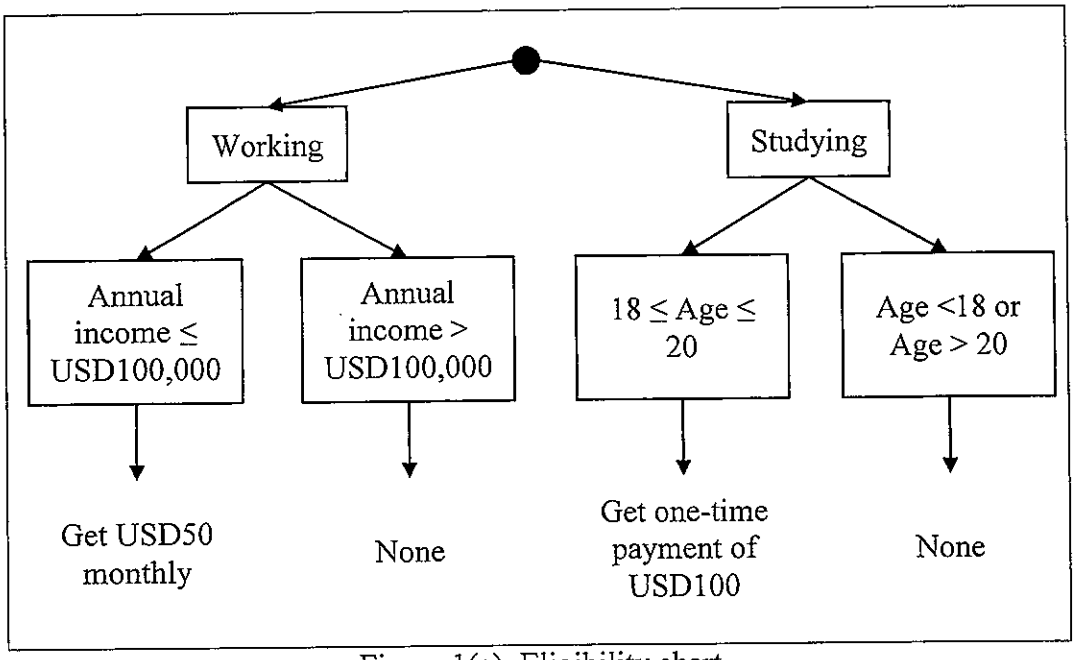

Figure 1(a): Eligibility chart

```
#include <stdio.h>

int main(){
    int work_or_study, age, income;

    printf("Are you (1) Working or (2) Studying? ");
    scanf("%d", &work_or_study);

    //Complete the rest of the program below
    if(        ){

    }
    else{

    }

    return 0;
}
```

Figure 1(b): Program to calculate allowance.

Continued...

```
Are you (1) Working or (2) Studying? 1
What is your annual income? 20000

BENEFITS
Get USD50 monthly.
```

```
Are you (1) Working or (2) Studying? 2
What is your age? 19

BENEFITS
You get one-time payment of USD100
```

Figure 1(c): **Bold and underlined** denote user's input.

[8 marks]

(b) Assume that `firstName` contains the string `"John"`, `midName` contains the string `"Alan"`, and `lastName` contains the string `"Smith"`. Assuming that each question is done independently of the other, provide the answer or output for the following questions or C statements:

(i) What is the name of the C header file that must be included to use string-related functions?

[1 mark]

(ii)
```
printf("%s %c. %s", firstName, midName[0], lastName);
```
[2 marks]

(iii)
```
strcpy(midName, lastName);
printf("%s\n", midName);
```
[1 mark]

(iv)
```
if(strcmp(midName, "Alan") == 1)
    printf("You get a discount!\n");
else
    printf("No discount.\n");
```
[1 mark]

(v)
```
i = strlen(strcat(firstName,lastName));
printf("%s\n", firstName);
printf("%s\n", lastName);
printf("%d\n", length);
```
[3 marks]

Continued...

(c) Declare a pointer `alphaPtr` that points to an object of type `int`. Assign the address of an integer variable called `number` to this pointer. Subsequently, assign a value of 5 to `number` by dereferencing `alphaPtr`.

[3 marks]

(d) Analyse the snippet of code shown in Figure 1(d) and determine the output.

```
#include <stdio.h>

int main(){
    int num1;
    int num2 = 13;
    int *Ptr1 = &num1;
    int *Ptr2 = &num2;

    *Ptr1 = *Ptr2*2;
    *Ptr2 = *Ptr1+*Ptr2;

    printf("*Ptr1 = %d\n", *Ptr1);
    printf("*Ptr2 = %d\n", *Ptr2);

    return 0;
}
```

Figure 1(d): Program Code

[6 marks]

Continued...

Question 2

(a) Figure 2(a) shows an incomplete C program to calculate a weekly gymnasium rental fee and the sample output of the program is shown in Figure 2(b). Study the program carefully, and answer the following questions.

```
#include <stdio.h>

float hourly_scale(char category);
void total_rental(float *rental_ptr, float hourly_rate);

int main()
{
    char category;
    float hourly_rate;
    float rental;

    printf("Enter your membership category (P for
            Platinum, G for Gold, O for others):");
    scanf("%c", &category);

    /*Answer for Q2(a)(iii) and (iv) - Function calls of
    hourly_scale and total_rental*/

    printf("The hourly rental rate for category %c is
            RM%.2f\n", category, hourly_rate);
    printf("The weekly rental fee for category %c is
            RM%.2f\n", category, rental);

    return 0;
}
/*Answer for Q2(a)(i) and (ii) - Function definitions of
hourly_scale and total_rental*/
```

Figure 2(a): Program to calculate weekly rental fee.

```
Enter your membership category (P for Platinum, G for
Gold, O for others): P
The hourly rental rate for category P is RM55.80
The weekly rental fee for category P is RM4140.36
```

```
Enter your membership category (P for Platinum, G for
Gold, O for others): G
The hourly rental rate for category G is RM76.50
The weekly rental fee for category G is RM5676.30
```

Figure 2(b): Sample output for 2 different inputs. **Bold and underlined** denote user's input.

Continued...

(i) Complete the function definition of `hourly_scale()`, which takes an input parameter `character`. This function returns the `hourly_rate` for a membership category as represented in Table 2(a):

Table 2(a): Hourly rates based on membership category.

Membership Category	**Hourly Rate (RM)**
Platinum	55.80
Gold	76.50
Others (*including any other input*)	85.30

[6 marks]

(ii) Complete the function definition of `total_rental()`, which takes two input parameters `rental_ptr` and `hourly_rate`. The function calculates the weekly rental fee based on the following information:

- Maximum rental hours per day is 10 hours.
- There are 7 days in a week.
- Add 6% to the total for miscellaneous charge.

[6 marks]

(iii) Write the C statement to call the function `hourly_scale()`, which determines the hourly rate (Note: Do not declare any new variable)

[3 marks]

(iv) Write the C statement to call function `total_rental()`, which calculates the total weekly rental fee. (Note: Do not declare any new variable)

[3 marks]

(b) Identify **SIX (6)** lines with errors in the code listed in Figure 2(c). For each line with error(s), write down the line number followed by the corrected version in your answer. For example:

Line 1: #include <stdio.h>

Hint: Assume the line with the prototype declaration is *correct*.

```
1  #include <stdio.c> //Ignore this. There are 6 others.
2
3  void fill_num(int, float *);
4
5  int main(){
6      int n;
7      fill num[30];
8      printf("Enter the numbers of elements: ");
9      scanf("%.d", &n);
10     fill_num(n, &num);
11     return 0;
12 }
13
14 fill_num(int n, float num[]){
15     int i;
16     if (i = 0; i <= n; ++i) {
17         printf("%d. Enter number: ", i + 1);
18         scanf("%.2f", &num[i]);
19     }
20 }
```

Figure 2(c): Source code with errors. The program is to store numbers into an array based on user inputs.

[7 marks]

Continued...

Question 3

(a) Describe **TWO (2)** advantages of writing your program output to a file, rather the displaying it on the computer screen.

[4 marks]

(b)

```
1  #include<stdio.h>
2
3  struct patient
4  {
5    char name[25];
6    int age;
7  };
8
9  int main()
10 {
11    struct patient p;
12    p.name = "Adam";
13    p.age = 63;
14    printf("%s %d\n", p.name, p.age);
15    return 0;
16 }
```

The above program returns compile time error when executed. What is the cause of error? Identify and correct the error.

[4 marks]

(c)

```
#include <stdio.h>

//Answer for Q3(c)(i) - struct Visitor definition

int main(){

    int i;

    //Answer for Q3(c)(ii)
    //Declare and initialize an array called list

    //Answer for Q3(c)(iii)
    //Display the name of phone number of male visitors

    return 0;
}
```

Figure 3(a): Program Listing

Continued...

Name	Gender	Phone Number
Darren	M	0183512951
Imran	M	0114651771
Amanda	F	0132552121
Viraj	M	0178856465

Table 3(a): Information of Visitor

You are required to write a program to store the record of visitors to a housing area. Based on the Program Listing in Figure 3(a), complete the program by answering the following questions:

(i) Define a suitable structure called `Visitor` that can be used to store the name, gender and phone number of visitors.

[3 marks]

(ii) Declare an array called `list` of the type `struct Visitor` and initialize it with the data in Table 3(a).

[4 marks]

(iii) By using `for` loop, display the name and phone number of male visitors on the screen.

[4 marks]

(d) Suppose you would like to copy contents (a string and a floating number) from a file and copy to another file. Write a C statement to accomplish the following:

(i) Open a file named '`file1.txt`' for reading and assign the returned file pointer to `fptr1`.

[1 mark]

(ii) Create and open a new file named '`file2.txt`' for writing and assign the returned file pointer to `fptr2`.

[1 mark]

(iii) Read a string `name` and a float number `salary` from the '`file1.txt`'.

[2 marks]

(iv) Write the text "The salary for `name` is RM `salary`" to the '`file2.txt`'

[2 marks]

Continued...

Question 4

(a) Identify which of the variables listed below are correctly or incorrectly named according to the rules of the C programming language. If incorrectly named, briefly state the reason why.

(i) `average_value`
(ii) `2ndValue`
(iii) `countdown2022`
(iv) `Class size`
(v) `discount_%`
(vi) `break`

[6 marks]

(b) Write down the output for each of the code snippets shown below:

(i)

```
int x;

for(x=500; x>0; x/=5)
    printf("%d ", x+10);
```

[2 marks]

(ii)

```
int i=0;

do{
    i += 1;

    if(i%5==0)
        continue;
    else
        printf("%d ", i);
}while(i<=20);
```

[3 marks]

Continued...

(iii)

```
int a = 4, b, total;

while(a > 0){
    total=a;
    printf("%d", a);

    for(b=2;b<10;b+=2){
        printf("+%d", b);
        total+=b;
    }

    printf("=%d\n",total);
    a-=1;
}
```

[4 marks]

(c) Write a complete C program that records and analyses 5 items that a user purchased during a sale. The program should (i) prompt the user to key in the price of 5 items **using a loop**, (ii) calculate the total price, (iii) calculate the average price, and (iv) identify and maximum and minimum prices.

To achieve the **FOUR (4)** requirements, you can use the following suggestions (not compulsory).

(i) Using a loop, the program prompts the user to key in the price of 5 items and **stores them in an array**.

(ii) Using a loop, sum up the prices of all 5 items stored in the array.

(iii) Calculate the average by dividing the total by 5.

(iv) Identify the maximum and minimum prices out of the 5 items purchased.

A sample of the output is shown in Figure 4(a).

```
Enter price of Item 1: 21.6
Enter price of Item 2: 78.5
Enter price of Item 3: 12.2
Enter price of Item 4: 45.1
Enter price of Item 5: 38.9

Average price: 39.26
Most expensive item: 78.50
Cheapest item: 12.20
```

Figure 4(a): **Bold and underlined** denote user's input.

[10 marks]

End of Paper